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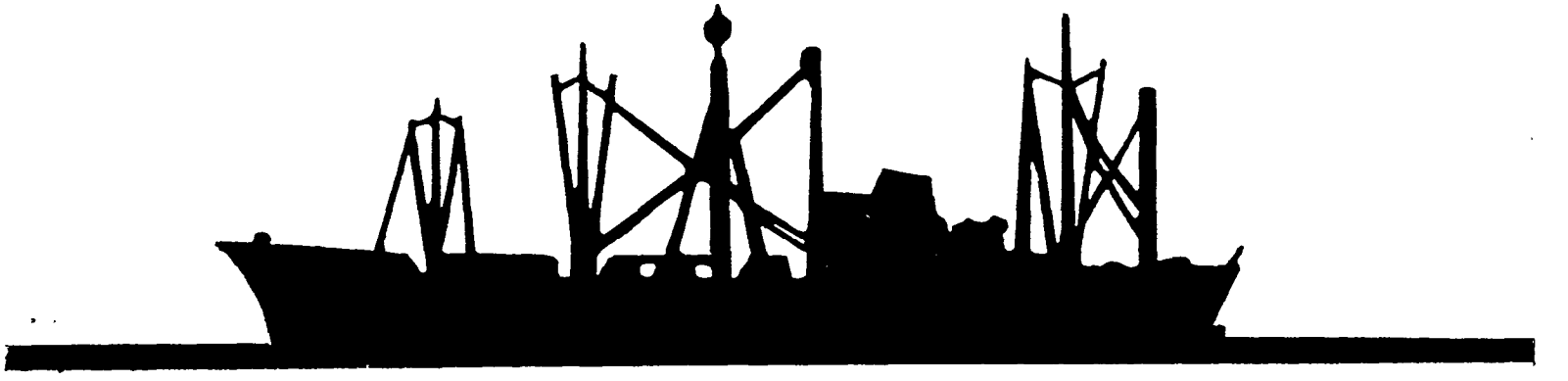

INSTITUTE FOR RESEARCH AND ENGINEERING FOR AUTOMATION AND PRODUCTIVITY IN SHIPBUILDING

I R E A P S

CASA: A SYSTEM FOR COMPUTER AIDED SHIP ACCOMMODATION

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Dr. Banda holds PhD degrees in naval architecture and in mechanical engineering. He has been appointed to the International Organizing Committee of ICCAS.

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Dr. Di Filippo is currently responsible for the design and development of a system for the general arrangement plan known as GAP. He previously served as project leader of the CASA system.

Dr. Di Filippo holds a PhD degree in mechanical engineering.

ABSTRACT

The Computer Aided Ship Accommodation (CASA) system is very advanced in the field of automatic design. CASA has been planned for the production of drawings of high graphic quality, the relevant bill of material, and the preparation of the workship documentation. The system uses interactive graphic techniques to facilitate both the man-machine communication and to increase the throughput and flexibility of the programs.

CASA has three main modules: (1) Description of standards is handled in batch mode. In this case the input concerns standard materials description and general selection rules. These data are stored into the database of the system; drawings and lists are also provided. (2) Description of ship design data. From structural drawings the main data are loaded into the computer for further processing. All the operations of this phase are considerably simplified (thanks to a particular "user-oriented" language) and do not require specific knowledge of EDP. Relevant output drawing will constitute the basic layout of accommodation. (3) Interactive automatic design. From description of construction data and standards with the aid of interactive functions of CASA, "automatic" and "interactive" design are developed. Automatic design, which foresees data processing for each constructive detail, is completely handled in its initial phase in batch mode. Interactive design allows corrections and modifications of data and programs with immediate feedback, thus giving the operator the possibility of a quick and easy communication with the computer.

The problem

Furnishing of naval superstructures includes: localization and -definition of habitable volumes, their sub divisions in cabins, service rooms, rooms for common use etc., definition of materials needed for construc tion of all this and for furnishing of all rooms; pre paration of all drawings and lists necessary for or ders, construction, and fitting up on board. This activity, which is gratifying for a creativity aspect in the phases of design and furnishing definition, be comes extremely boring in the successive phase concerning detailed specification of the thousands of compo nents necessary.

The solution

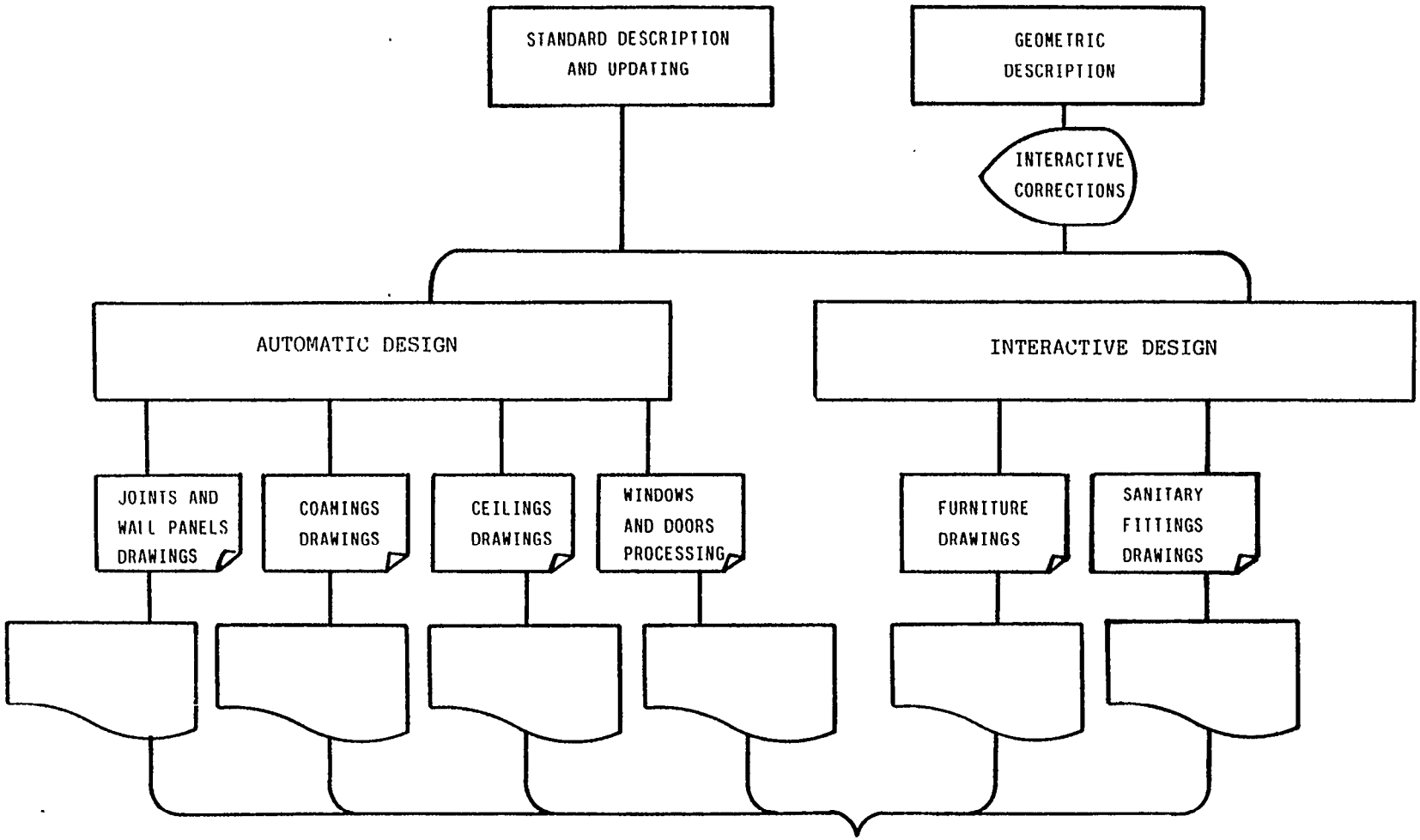
The CASA (Computer Aided Ship Accomodation) without interfering with designer's creativity, and helping instead the designer with ease of execution in his choice among many alternatives, automatically produces all drawings consequent upon design activities, subdivides furnishing elements in elementary components, prepares materials lists and automatically produces all work-shop documents.

CASA SYSTEM

The CASA system is subdivided into three principal modules:

- STANDARDS DESCRIPTION
- GEOMETRIC DESCRIPTION OF SHIP AND AUTOMATIC DESIGN
- DESIGN **IN** THE INTERACTIVE MODE

CASA SYSTEM GENERAL FLOW



· BILL OF MATERIALS AND WORKSHOP DOCUMENTS

STANDARD DESCRIPTION

At the basis of any computer data handling there is always a high standardization of material to be handled.

But standardization introduces into design a rigidity factor which, if it is not carefully estimated, may considerably reduce the utility of the software tool.

The CASA management of standards has overcome this obstacle by allowing to insert, cancel and modify the standardized elements by simple draftsmen operations.

The most important furnishing elements to be codified are: doors, walls, ceilings, sidelights, windows, furniture, sanitary fittings, profiles of walls and ceilings, support furrings, coamings, etc.

All standardized materials are completed with a code which foresees on easy identification of the product and of its components from the order to the reception, manifacturing and installation on board.

The data-base of standards stores the codes and data regarding the materials to be used in all ships.

For every new ship the general standards are examined and if necessary integrated or modified.

In the standards data-base are also stored the graphic elements which appear in the drawings such as: beds, tables, chairs etc.

GEOMETRIC DESCRIPTION OF THE SHIP

The first phase of this job consists of description of all geometric and topographic features of all fur nishing elements and of all structures which are essential for the successive design work.

Subdivision into decks

The ship's superstructures are subdivided into decks and the relevant data are stored deck by deck.
The elements and structures to be stored are:

- steel walls
- internal furnishing walls
- web frames
- girders
- stiffeners
- pillars
- sidelights and windows
- doors
- reference lines
- blocks subdivision lines

The first result of the work performed is a plan obtained by plotter visualizing all input data.

DECK — JOB ORDER CODE — ZONE — ELEMENT NAME — ELEMENT TYPE — ELEMENT'S CO-ORDINATES

```
@ELT,IL DATI
ELTOT7 RLIB72 01/25-12:04:08-(,0)
000001      000    PONTE 4343 74 B DECK
000002      000    INPUT
000003      000    ORIGIN R031
000004      000    PARETI L MET 0 10080 12800 PIU08
000005      000    PARETI T MET 10080 12800 -10080 PIU08
000006      000    PARETI L MET 12800 -10080 0 MEN08
000007      000    PARETI T MET -10080 0 10080 MEN08
000008      000    PARETI L MET R041 5040 R047 PIU06 S
000009      000    PARETI L MET R031 5040 R032 000700 PIU06
000010      000    PARETI T MET 5040 R039 -5040 MEN06
000011      000    PARETI L MET R033 000050 -5040 R031 MEN06
000012      000    PARETI T MET -1680 R036 3480 PIU06
000013      000    PARETI T MET -1680 R035 -2750 MEN06
000014      000    PARETI L MET R035 -2750 R035 000200 PIU06
000015      000    PARETI T MET -2750 R035 000200 -4640 MEN06
000016      000    PARETI L MET R035 000200 -4640 R035 000075 MEN06
000017      000    PARETI L MET R035 000200 -4240 R037 MEN06
000018      000    PARETI T MET -5040 R037 -3440 MEN06
000019      000    PARETI L MET R037 -3440 R038 MEN06
000020      000    PARETI T MET -3440 R038 -5040 MEN06
000021      000    PARETI T MET 5040 R035 3480 PIU06
000022      000    PARETI L MET R035 3480 R037 PIU06
000023      000    PARETI T MET 3480 R037 5040 PIU06
000024      000    PARETI L MET R035 -1680 R039 MEN06
000025      000    PARETI L MET R034 000200 5040 R039 PIU06
000026      000    PARETI L MET R034 000350 -5040 R039 MEN06
000027      000    PARETI L MET R038 -3840 R039 PIU06
000028      000    PARETI T MET 200 R039 000260 -200 PIU08
000029      000    PARETI L MET R039 -200 R039 000260 -200 MEN08
000030      000    PARETI L MET R039 200 R039 000260 PIU08
000031      000    PARETI L ARP 400 9600 12300 S
000032      000    PARETI T ARP 5100 S
000033      000    PARETI L ARP 7700 S
000034      000    PARETI T ARP 9600 7700 -9600
000035      000    PARETI L ARP 7700 4800 12300 S
000036      000    PARETI T ARP  -4800
000037      000    PARETI L ARP  7700 1600 12300 S
000038      000    PARETI T ARP  9600 9200 6100 S
000039      000    PARETI L ARP  7700 S
000040      000    PARETI L ARP  7700 8100 9200 S
000041      000    PARETI L ARP  7700 7600 9200 S
000042      000    PARETI L ARP  7700 3300 9200 S
000043      000    PARETI T ARP  4800 S
000044      000    PARETI L ARP  7700 100 9200
000045      000    PARETI T ARP 1600
000046      000    PARETI L ARP  0 6100 7700 S
000047      000    PARETI T ARP  6100 400 9600
000048      000    PARETI T ARP  5100 1500 6100 S
000049      000    PARETI T ARP 6100 4400 9600 S
000050      000    PARETI T ARP -9600 400 -7600
000051      000    PARETI T ARP -6100 300 -6900
000052      000    PARETI T ARP -7600 1800 -6100
000053      000    PARETI L ARP 300 -7600 1800
000054      000    PARETI L ARP R031 5100 R033
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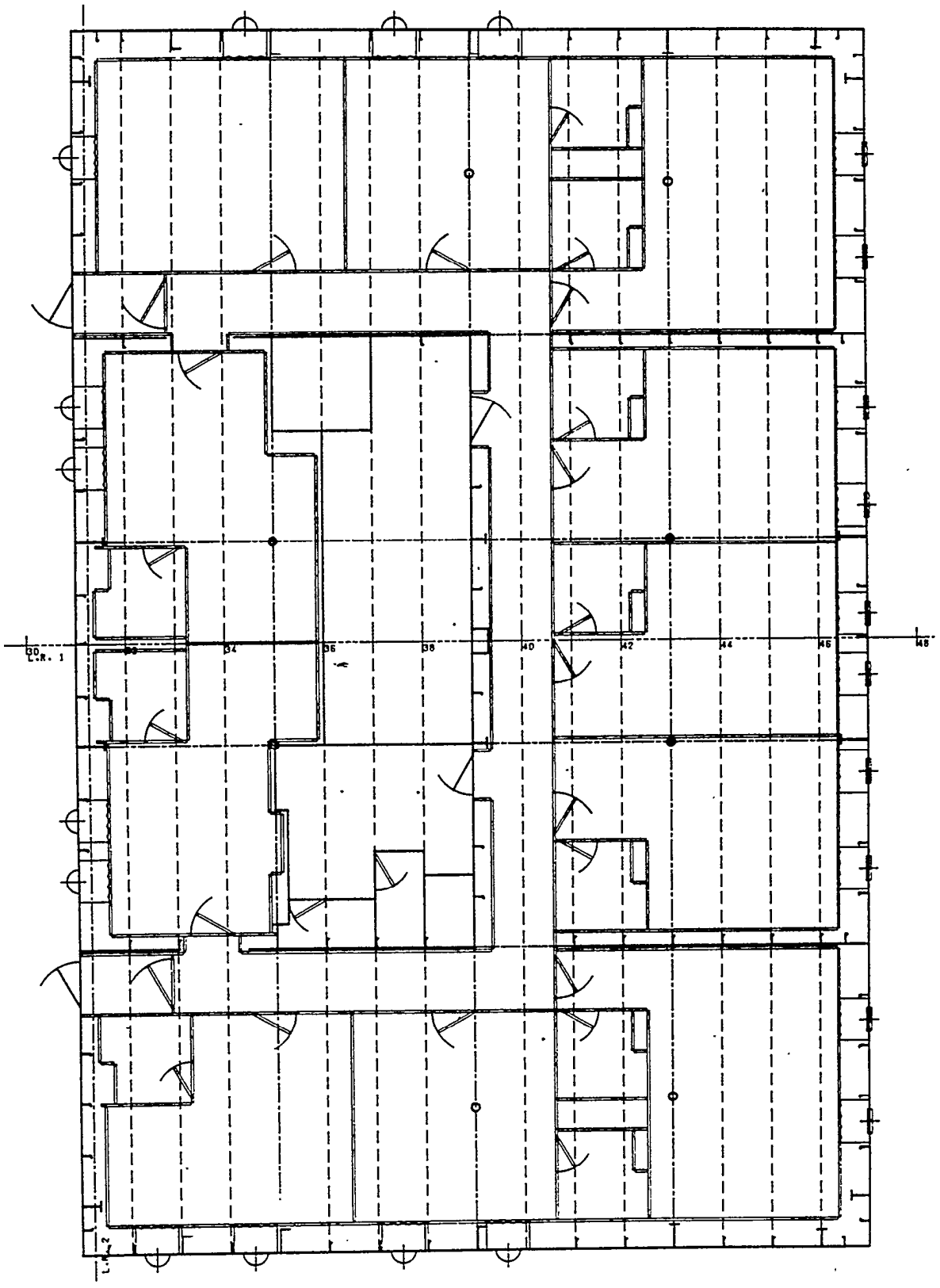
30
L.R. 1
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Interactive correction of data

In this phase it is already possible to intervene in the interactive mode; in fact, using a graphic interactive screen the basic data(as bulkheads, sidelights , or doors) can be simply and immediately corrected.

Menii ,

In order to free the operator from the need to acquire knowledge of the computer operating system, a command table (MENU') is visualized on the screen to facilitate all operations of communication with the computer.

Ease of communication with the computer

By setting the screen cross-hair, on one of the menu rectangles, the program is set to perform all required operations.

Data safety

In the working phases the system, in order to avoid unintentional damages of data by the user, operates on temporary files which are created each time, while the ship file is used only in the reading and up-dating phases.

Output facilities

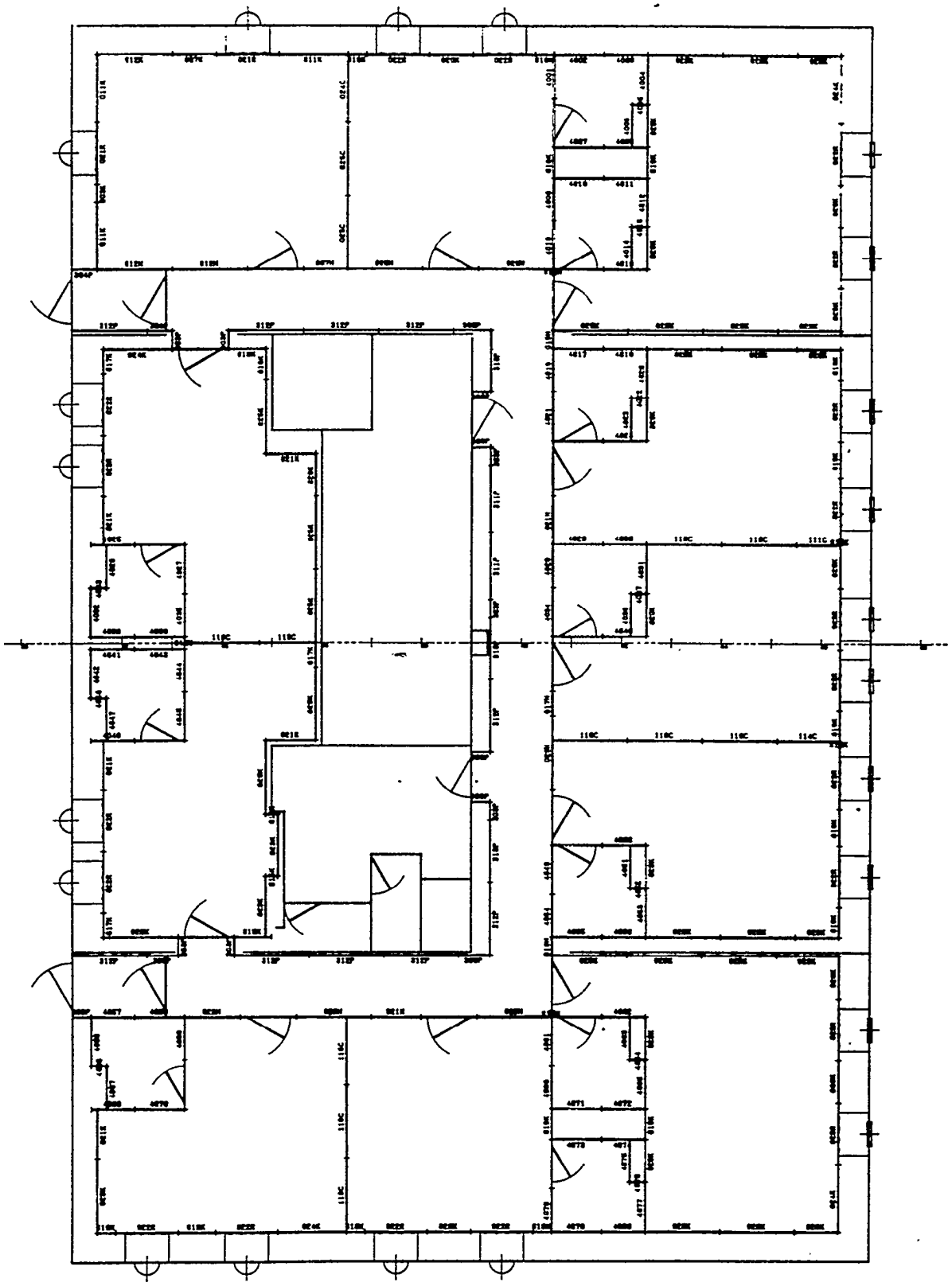
By utilization of the command table, it is also possible to address the stored data to any external support: graphics screens, pen-plotters and printer plotters.

AUTOMATIC DESIGN

After all data are stored and checked, the successive procedures of automatic design are utilized.

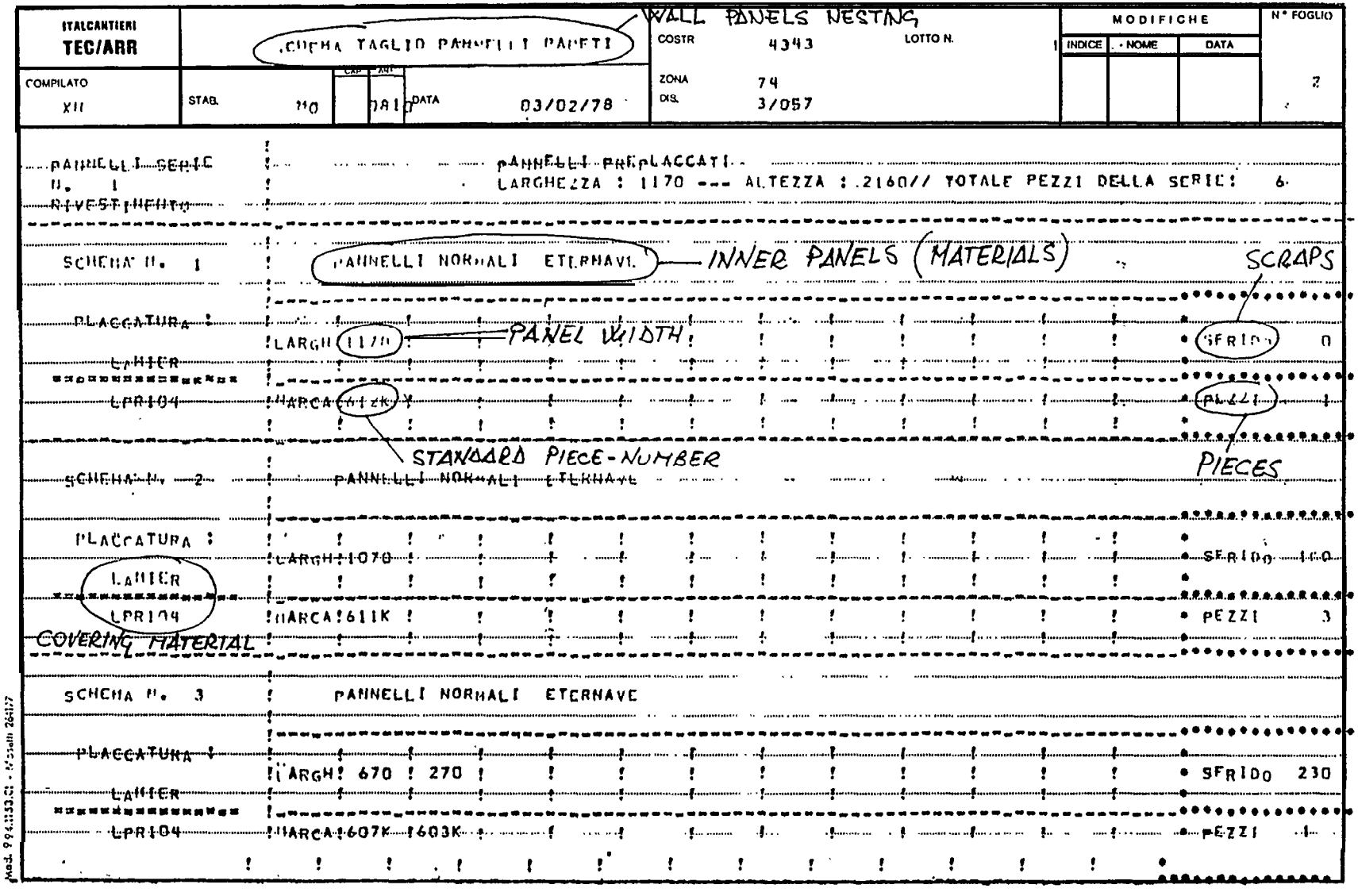
Procedure for panels, bulkheads, and joints

CASA automatically subdivides into panels, with modular criteria, all internal furnishing walls.
According to the colour and the type of wall they belong to, it classifies and marks all panels, classifies and marks all joints; it produces according to specific criteria of scrap reduction, the cutting schemes for panelling, the plan for joints and all materials lists necessary for order and installation of relevant materials.



Wall panels nesting booklet

These lists are obtained by an automatic procedure starting from the data relevant the decks to be processed and materials to be employed in the construction of the panels.
The following pages show the scheme to be used in the workshop for cutting panels, the scrap of **mate**rials, the total quantity of the panels to be made per lot and the total average scrap.



ITALCANTIERI
TEC/ARR

SCHEMA TAGLIO PANNELLI PARETI — WALL PANELS NESTING

COMPILATO: XII
STAB. 110 CAP 081 ANT
DATA 03/02/78

COSTR 4343 LOTTO N. 1
ZONA 74
DIS. 3/057

MODIFICHE: INDICE | NOME | DATA

N° FOGLIO 7

PANNELLI SERIE N. 1 — PANNELLI PREPLACCATI
LARGHEZZA : 1170 --- ALTEZZA : 2160// TOTALE PEZZI DELLA SERIE: 6

RIVESTIMENTO

SCHEMA N. 1 — PANNELLI NORMALI ETERNAVE — INNER PANELS (MATERIALS)

PLACCATURA : LARGH 1170 — PANEL WIDTH — SFRIDO 0

LAMIER

LPR104 MARCA 611K — STANDARD PIECE-NUMBER — PEZZI 1 — PIECES

SCHEMA N. 2 — PANNELLI NORMALI ETERNAVE — SCRAPS

PLACCATURA : LARGH 1070 — SFRIDO 100

LAMIER

LPR104 MARCA 611K — PEZZI 3

COVERING MATERIAL

SCHEMA N. 3 — PANNELLI NORMALI ETERNAVE

PLACCATURA : LARGH 670 ! 270 — SFRIDO 230

LAMIER

LPR104 MARCA 607K 603K — PEZZI

Mod. 994.153.01 - Arcelli 26417

Material withdrawal notes The withdrawal notes are automatically obtained. They contain the information to withdraw the material necessary for the construction of the wall panels.

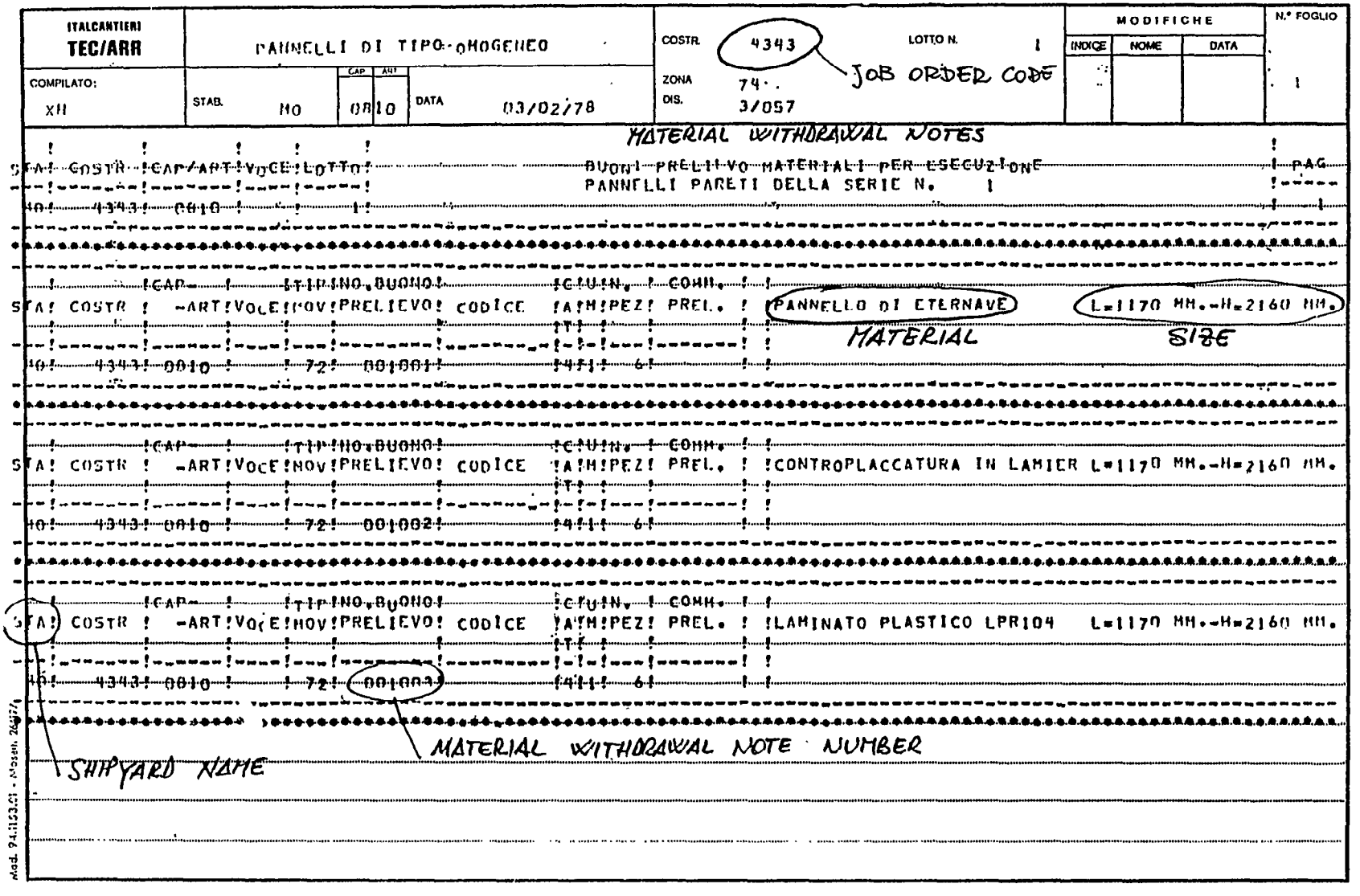
ITALCANTIERI TEC/ARR	SCHEMA TAGLIO PANNELLI PARETI		COSTR. 4343	LOTTO N. 1	MODIFICHE			N.° FOGLIO
					INDICE	NOME	DATA	
COMPILATO XII	STAB. 110	CAP 0810	ZONA 74 DIS. 3/057	DATA 03/02/78				28

PANEL QUANTITY PER LOT

TOTALE PANNELLI DELLE VARIE MARCHE E LARGHEZZE DA ESEGUIRE PER QUESTO LOTTO 250

SFRIDO MEDIO DOVUTO A TAGLI SEGA ED A RITAGLI NON UTILIZZABILI 10.306%

AVERAGE SCRAP



ITALCANTIERI
TEC/ARR

PANNELLI DI TIPO OMOGENEO

COMPILATO: XII

STAB. MO | CAP 08 | AUT 10 | DATA 03/02/78

COSTR. 4343 LOTTO N. 1

ZONA 74

DIS. 3/057

JOB ORDER CODE

MODIFICHE: INDICE | NOME | DATA

N.° FOGLIO 1

MATERIAL WITHDRAWAL NOTES

BUONI PRELIEVO MATERIALI PER ESECUZIONE
PANNELLI PARETI DELLA SERIE N. 1

PAG.

STA	COSTR	CAP	ART	VOCE	LOTTO
10	4343	0810			1

STA	COSTR	CAP	ART	VOCE	NOV	TIP. NO. BUONO	PRELIEVO	CODICE	C.U.	IN.	A	M	PEZ	COMM.	PREL.
10	4343	0810			72	001001		4411		6					

PANNELLO DI ETERNAVE — MATERIAL

L=1170 MM.-H=2160 MM. — SIZE

STA	COSTR	CAP	ART	VOCE	NOV	TIP. NO. BUONO	PRELIEVO	CODICE	C.U.	IN.	A	M	PEZ	COMM.	PREL.
10	4343	0810			72	001002		4411		6					

CONTROPLACCATURA IN LAMIER L=1170 MM.-H=2160 MM.

STA	COSTR	CAP	ART	VOCE	NOV	TIP. NO. BUONO	PRELIEVO	CODICE	C.U.	IN.	A	M	PEZ	COMM.	PREL.
10	4343	0810			72	001003		4411		6					

LAMINATO PLASTICO LPR104 L=1170 MM.-H=2160 MM.

SHIPYARD NAME

MATERIAL WITHDRAWAL NOTE NUMBER

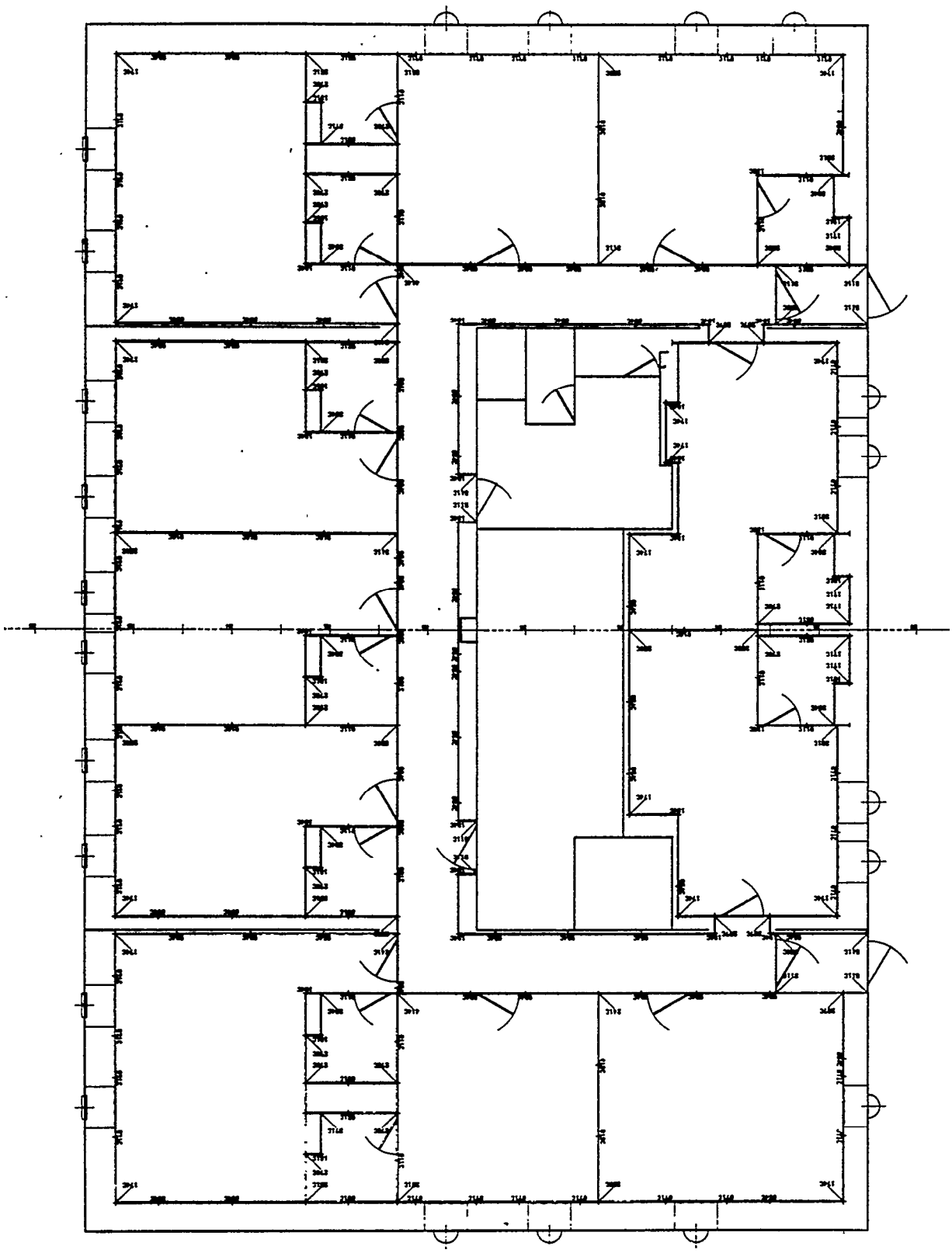
Mod. 94.1153.01 - Nissen 26/76

ITALCANTIERI TEC/ARR	CONSUNTIVO FABBISOGNO PANNELLI PARETI	COSTR. 4343	LOTTO N. 1	MODIFICHE (INDICE / NOME / DATA)	N° FOGLIO
COMPILATO: XII	STAB. MO — CAP 08 ART 10 — DATA 03/02/78	ZONA 74 DIS. 3/057			1/3

ELEMENT NAME	KIND OF WALL	SIZE	PIECES	
PANNELLI DI ETERNAVE	PER PARETI NORMALI	1170X2160	PEZZI	87
PANNELLI DI ETERNAVE	PER PARETI DI CLASSE B	1170X2160	PEZZI	33
PANNELLI DI	LAMIER PER CONTROPLACCATURA PANNELLI NORMALI..........	1170X2160	PEZZI	72
PANNELLI DI	LAMIER PER CONTROPLACCATURA PANNELLI CLASSE B	1170X2160	PEZZI	21
PANNELLI DI ETERNAVE	PER PARETI NORMALI LOC.IG.PREALL.......	770X2160	PEZZI	66
PANNELLI DI ETERNAVE	PER PARETI DI CLASSE B L.IG.PREALL.....	770X2160	PEZZI	8
PANNELLI DI	LAMIER PER CONTROPLACCATURA PANNELLI L.IG.PREALL.....	770X2160	PEZZI	37

Summary of material requisition order

This output shows the material summary of the wall-panels relevant to a lot.



ITALCANTIERI TEC/ARR	LISTINA QUANTITATIVI GIUNTI E RELATIVI COMPONENTI	COSTR. 4343	LOTTO N. 1	MODIFICHE: INDICE / NOME / DATA	N.° FOGLIO
COMPILATO: XP	TAB. PO CAP 08 ART 10 DATA 03/02/78	ZONA 74 DIS. 3/051			11

STANDARD PIECE-NUMBER

SERIE N. 21 - MARCA 236C — MARCA COMPLETA PA*236JC - COLORE COME LPR358 - COMPLESSI DA ESEGUIRE 4

(COLOUR: LPR358; QUANTITY: 4)

COMPONENTI:	PEZZI PER COMPLESSO:	N. TOTALE COMPONENTI:
PROFILO MARCA A009	1	4
PROFILO MARCA A138	1	4
PROFILO MARCA A070	1	4
VITI AB 4.2X32 UNI 6956	7	28
VITI NF 925830 4.5X20	26	104
TRECCIA AMIANTO 25X10 H=2180	1	4
TRECCIA AMIANTO 25X3 H=2180	1	4

(QUANTITY: 7)

COMPONENTS

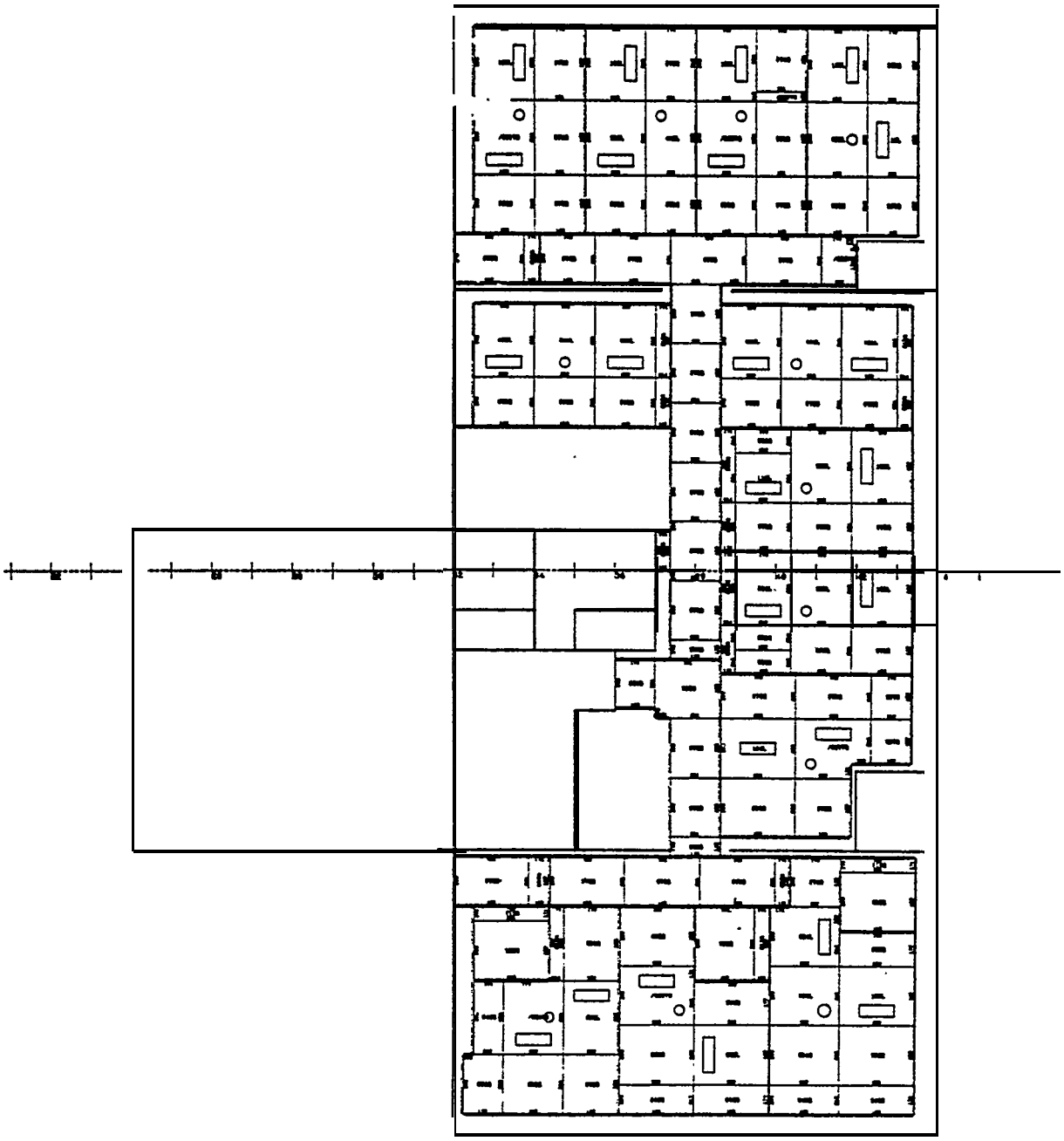
SERIE N. 22 - MARCA 031C — MARCA COMPLETA PA*031JC - COLORE COME LPR358 - COMPLESSI DA ESEGUIRE 4

COMPONENTI:	PEZZI PER COMPLESSO:	N. TOTALE COMPONENTI:
PROFILO MARCA A009	1	4
PROFILO MARCA A030	1	4
GIRANDOLE TIPO 461	1	4
VITI AB 4.2X16 UNI 6956	6	24
VITI AB 4.2X32 UNI 6956	1	4
TRECCIA AMIANTO 25X10 H=2180	1	4
TRECCIA AMIANTO 25X3 H=2180	1	4

Procedure for ceiling panels

CASA, by working cabin by cabin, subdivides the ceiling into panels following a criterion aiming principally at reducing the junction profiles length and the number of non rectangular panels; the research of the best solution is automatic but it is always possible to introduce, by screen, preferential subdivision Lines and the system automatically fits the subdivision to the imposed lines.
After subdivision, individuation, and marking of panels, storing and marking is performed for profiles and support structural elements of the panels and of ceiling Lamps.
As automatic outputs we have:

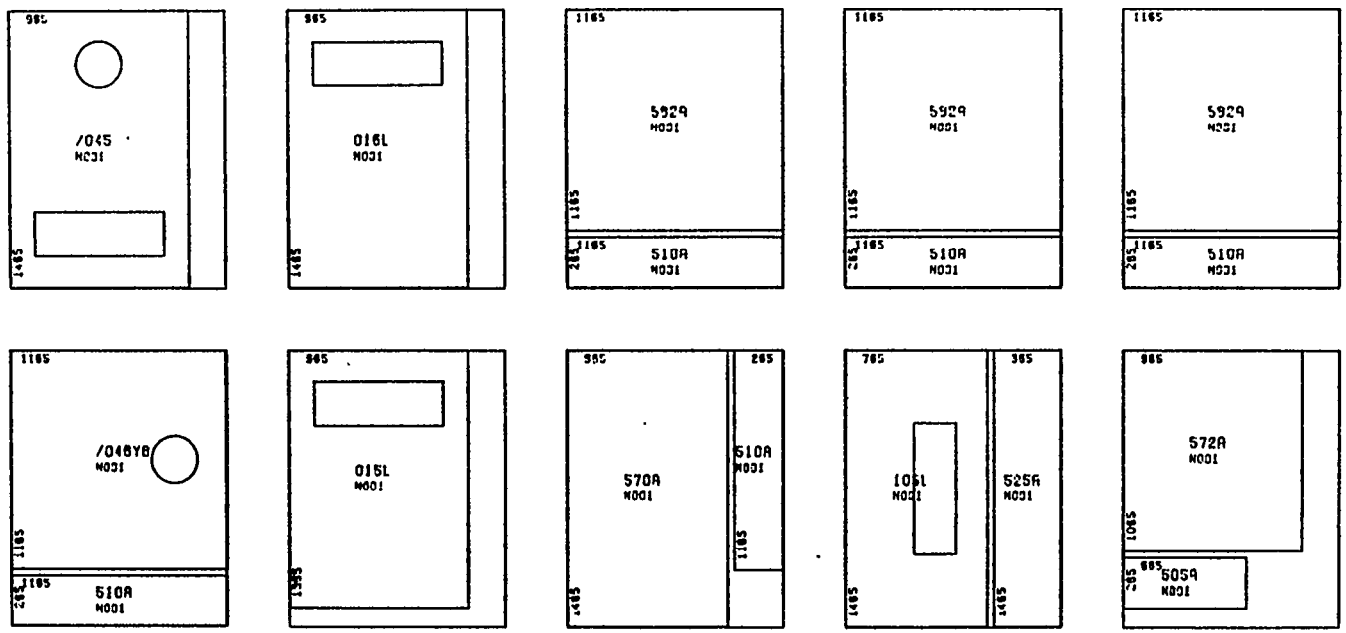
- plan for ceiling panelling
- plan for furrings
- panels nesting
- material lists for procurement, construction, and installation of materials on board.



ITALCANTIERI - TEC/ARR				DIS 837270061	COSTR. 4363
DATA	NOME	FIRMA	SCALA	TITOLO	ZONA 76
	CL [illegible]		1:20	SCHEMI TAGLIO PER L'ESECUZIONE DEI PANNELLI PER SOFFITTI	FOGLIO NO. 4

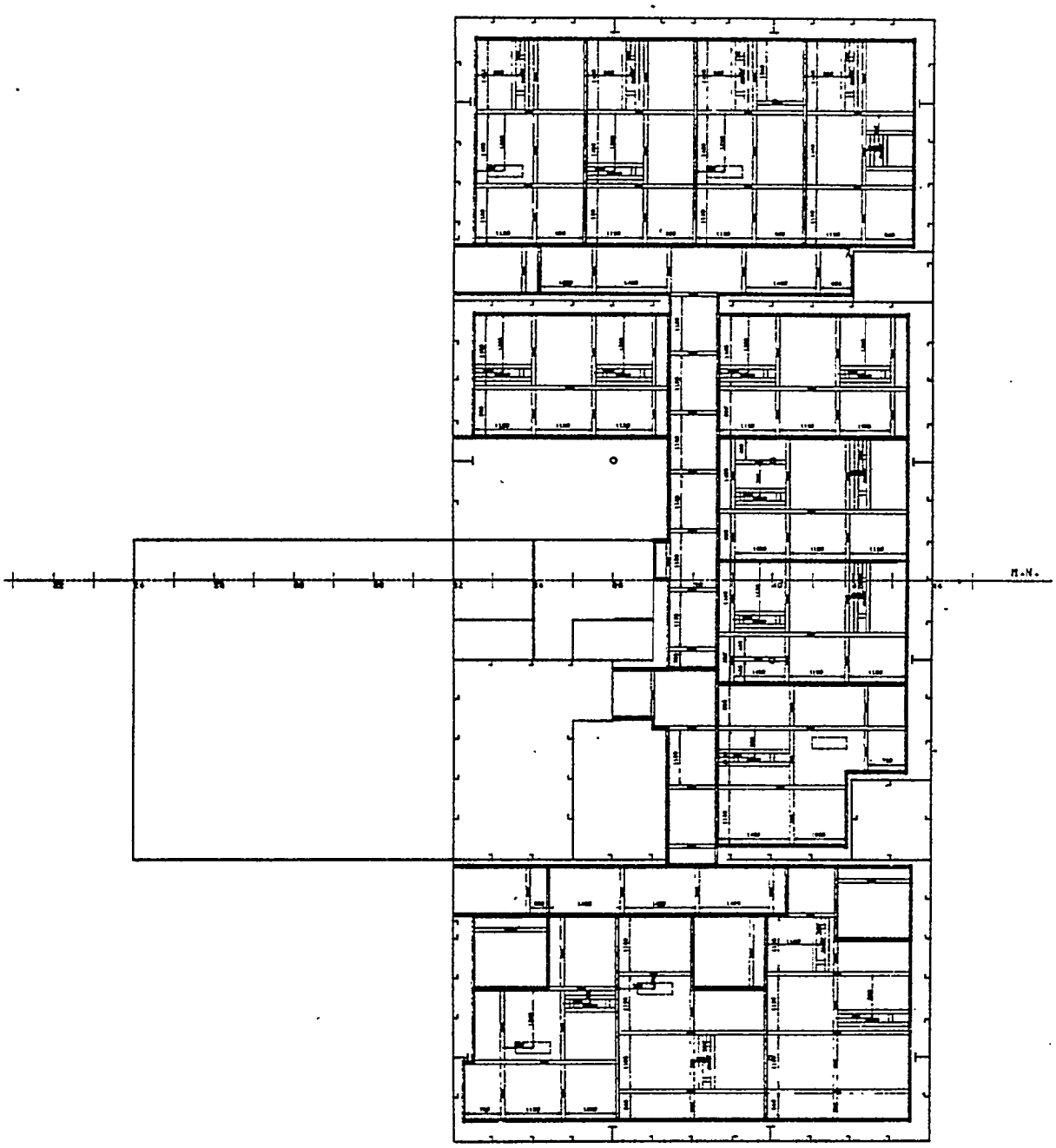
CEILINGS PANELS NESTING

PANNELLI CLASSE N DIS. TI 727340 - TI 727440 ESECUZIONE A
ANIMA IN PANNELLO AD IMPASTO ESENTE DA AMIANTO SP. 9.6
LAMINATO PLASTICO FACCIA IN VISTA COLORE LPR023 TIPO N SP. 1 NE 214010
CONTROPLACCATURA LAMINATO FENOLICO TIPO N SP. 1 NE 216010



ITALCANTIERI TEC/ARR	DISTINTA PANNELLI PER SOFFITTI / CEILINGS PANELS LIST	COSTR. 4363 (JOB ORDER CODE) LOTTO N. 2	MODIFICHE: INDICE / NOME / DATA	N.° FOGLIO
COMPILATO: DE PAG	STAB. MU — CAP 08 — ART 11 — DATA 22/11/78	ZONA 72 — DIS. B37270061		1

PIECE NUMBER (MARCA)	PEZZI	MARCA	PEZZI	MARCA	PEZZI	MARCA	PEZZI
585A	2	123L	2	/001YB	1	025L	7
/006YB	1	/002YB	1	584B	1	583A	2
121L	1	/004YB	1	580B	1	576B	4
576A	7	/005YB	1	582A	2	575B	2
574B	1	574A	1	569A	1	573A	2
573B	4	563A	4	562B	1	572A	1
572B	1	567A	2	561A	1	571A	1
560A	1	565A	1	552A	1	558B	1
544A	1	536A	1	170L	1	543A	1
556A	1	541A	2	548A	2	522A	1
530A	1	513A	1	512B	1	520B	3
520A	1	510A	2	508A	1	508B	1
507A	1	/003YB	1	504A	1	501B	1
/007YB	1	/008YB	1	/009YB	1	/010YD	1
/011YB	1 (NUMBER)	/012YB	1				



ITALCANTIERI TEC/ARR	DISTINTA PROFILI PER SOFFITTI	COSTR. 63	LOTTO N. A	MODIFICHE: INDICE / NOME / DATA	N.° FOGLIO
COMPILATO: FURLAN	STAB. MO — CAP 08 — ART 11 — DATA 22/11/78	ZONA 72 — DIS. B37270061			1

ELENCO PROFILI PER IMBONAGGI — FURRING PROFILES LIST

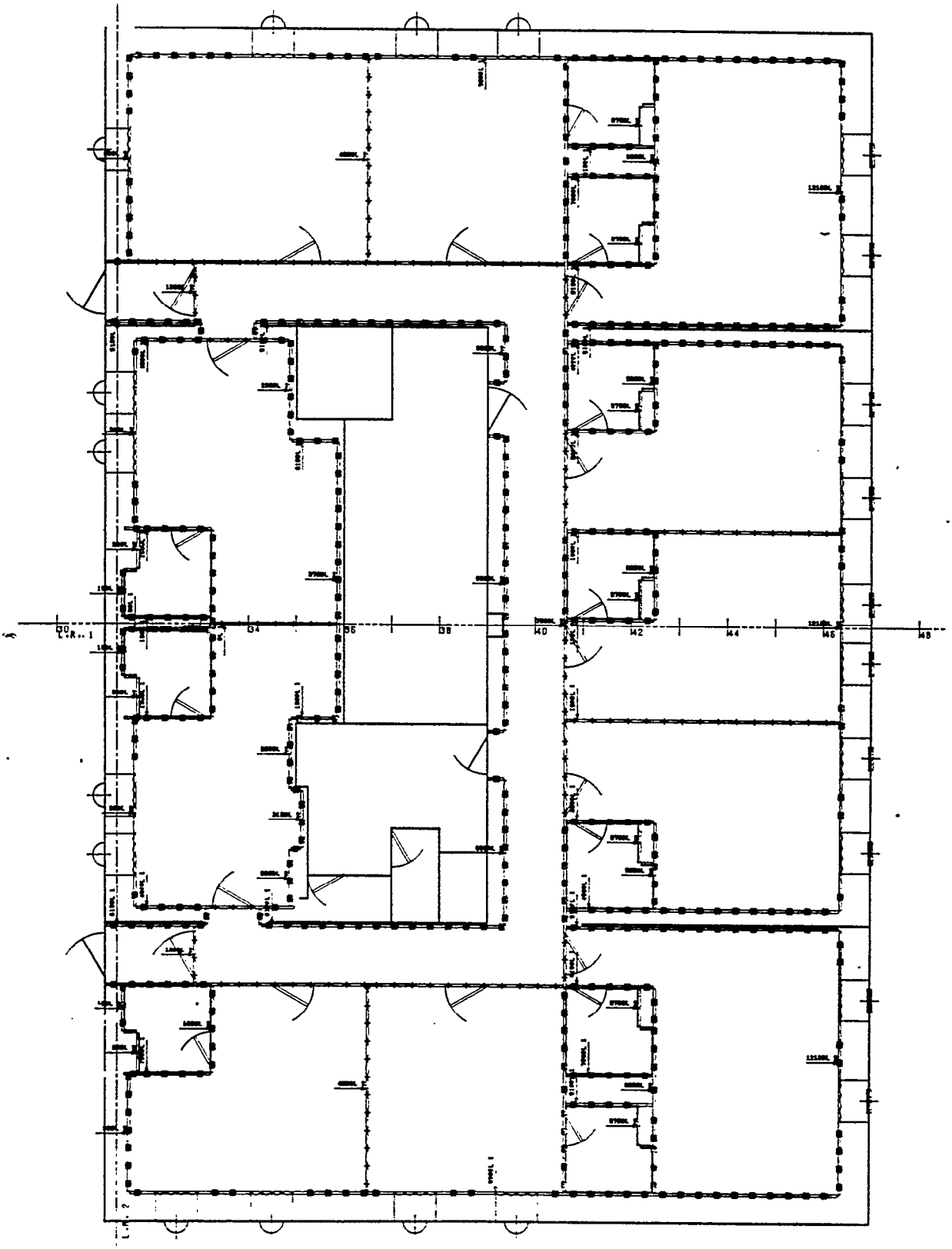
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 522	PEZZI	3	LUNGHEZZA	210	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 526	PEZZI	1	LUNGHEZZA	610	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 527	PEZZI	8	LUNGHEZZA	710	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 528	PEZZI	5	LUNGHEZZA	810	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 529	PEZZI	26	LUNGHEZZA	910	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 530	PEZZI	2	LUNGHEZZA	1010	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 531	PEZZI	15	LUNGHEZZA	1110	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 532	PEZZI	2	LUNGHEZZA	1210	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 533	PEZZI	2	LUNGHEZZA	1310	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 534	PEZZI	9	LUNGHEZZA	1410	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 536	PEZZI	1	LUNGHEZZA	1610	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 541	PEZZI	1	LUNGHEZZA	2110	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 546	PEZZI	1	LUNGHEZZA	2610	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 547	PEZZI	1	LUNGHEZZA	2710	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 552	PEZZI	1	LUNGHEZZA	3210	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 554	PEZZI	2	LUNGHEZZA	3410	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 558	PEZZI	1	LUNGHEZZA	3810	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 560	PEZZI	1	LUNGHEZZA	4010	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 566	PEZZI	1	LUNGHEZZA	4610	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 568	PEZZI	1	LUNGHEZZA	4810	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 570	PEZZI	2	LUNGHEZZA	5010	
NI 724550	IMBONAGGIO FINITO PER SOFFITTI TIPO 572	PEZZI	1 (QUANTITY)	LUNGHEZZA	5210 (SIZE)	

ELENCO PROFILI PER IMBONAGGI - ARCHITRAVI — BULKHEADS UPPER PROFILES LIST

PROFILO SPECIALE SAGOMATO A FREDDO TIPO 701 LUNGH. 6000 - PEZZI 5
PROFILO SPECIALE SAGOMATO A FREDDO TIPO 702 LUNGH. 6000 - PEZZI 9
NI 724550 CAVALLETTO TIPO 431 - PEZZI 174

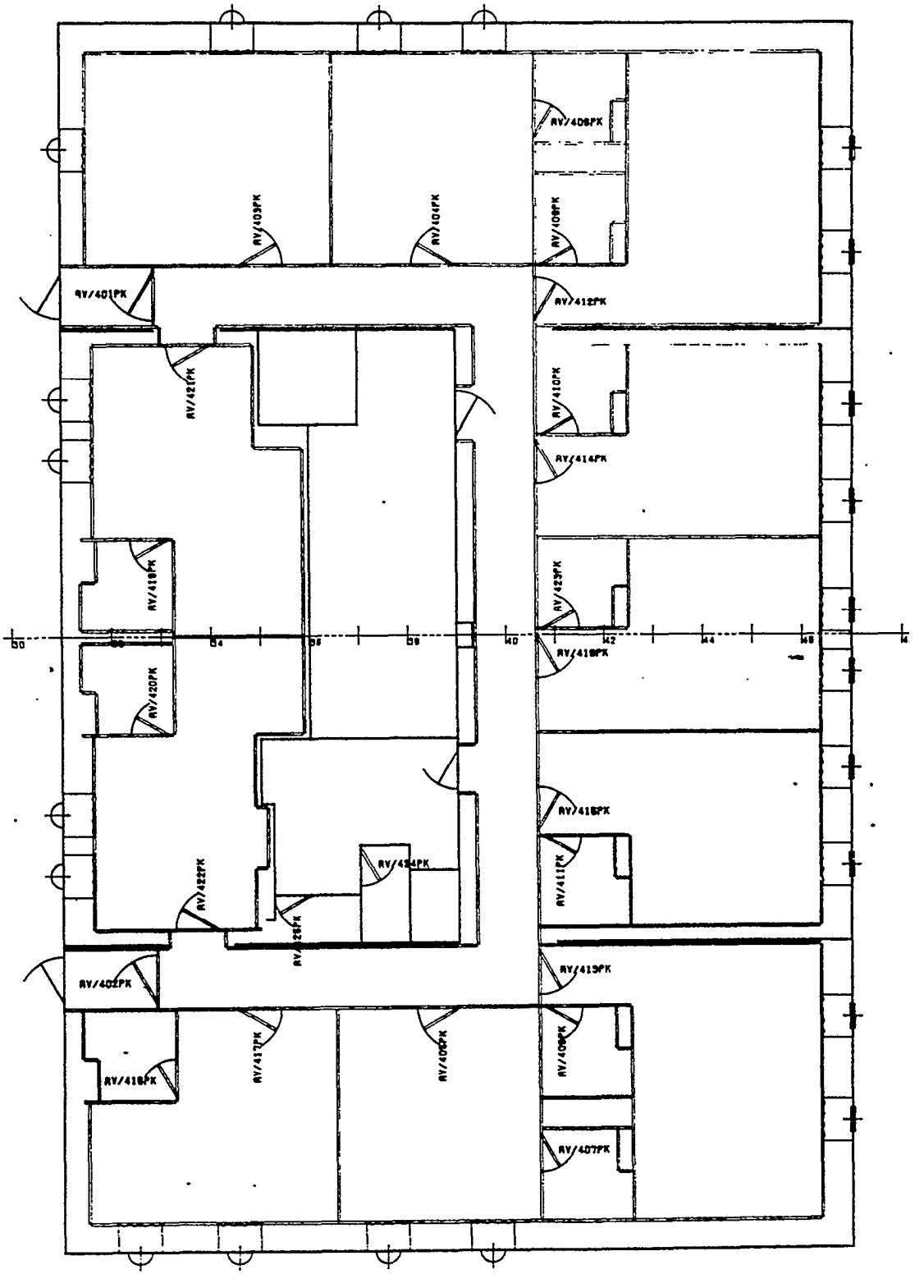
Procedure for coamings

On the basis of data regarding bulkheads, the type of room concerned, and height of the utilized floor foundation, the various types of profiles necessary for panels support are identified; after being identified, they are drawn with a symbol which is different for each type of profile.
The produced plan reports also the profiles dimensions to the next reference line.
As for the all other outfitting materials also with this procedure all materials lists are automatically produced.



Procedures for doors, sidelights, and windows

Processing of previously stored data produces dimensioned and marked plans regarding doors, sidelights and windows and all relevant material lists.



INTERACTIVE DESIGN MODE

In the procedures in which, owing to the fact that the graphic elements to be handled are complex and unforseeable, it is essential to have the availability of the shapes, dimensions and obstacles for a correct storing. For that a graphic-interactive wor king mode has been adopted.
As hardware support a TEKTRONIX screen, with refresh buffer, was chosen and connected to the Main Computer.
The principal interactive design procedures are those regarding:

- Furniture
- Sanitary fittings
- Ceiling lamps and anemostats

Procedure for forniture

Differently from other procedures where the deck is the working unit, here the work is performed cabin by cabin in order to increase the execution speed by reducing the graphic elements down to the essential.

* Ease of use

In order.to help the operator, it was decided to standardize, besides all pieces of furniture which may interest naval furnishing, also all possible fur nishing combinations for each type of cabin.
In this way when the operator retrives the cabin on the screen, all the pieces of furniture which can be there inserted are automatically connected to the cabin's code; they appear one after the other on the screen in the most rational order for the furnishing sequence.

Ease of movements

The graphic elements, which can be connected by a characteristic point at the cross-hair, may be moved on the whole screen and rotated by any angle until they find their most suitable position.

Furnishing for symmetrical or translated cabins

In the case that very often happens in the naval field in which cabins are involved having a perimeter symmetrical or translated with reference to other cabins already furnished, by simple commands it is

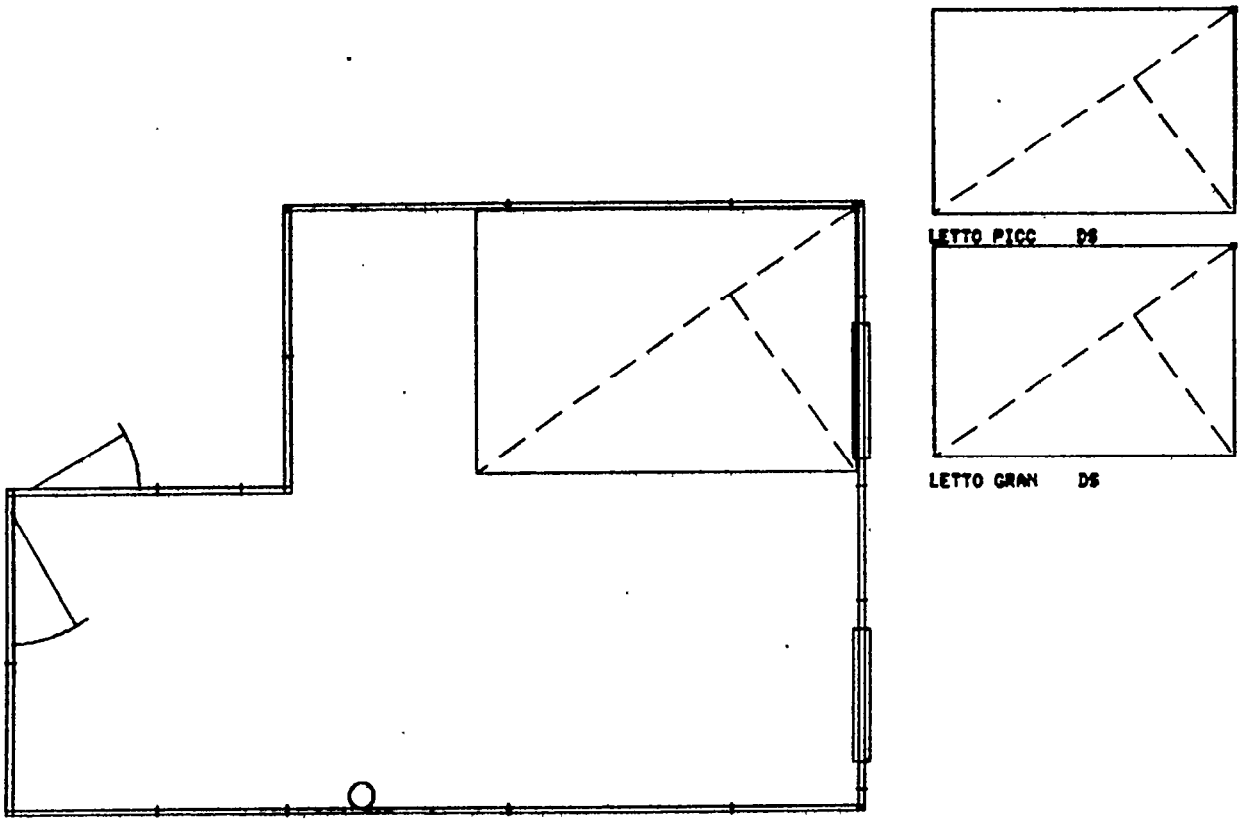
possible to reverse or translate the existing furniture disposition and avoid the tedious repetition of the work; in this way it is possible to furnish the whole ship deck in a very short time.

Design speed

After all cabins are furnished, the system produces, besides the plans in the requested scale, all materials list necessary for construction and assembling of furniture on board.

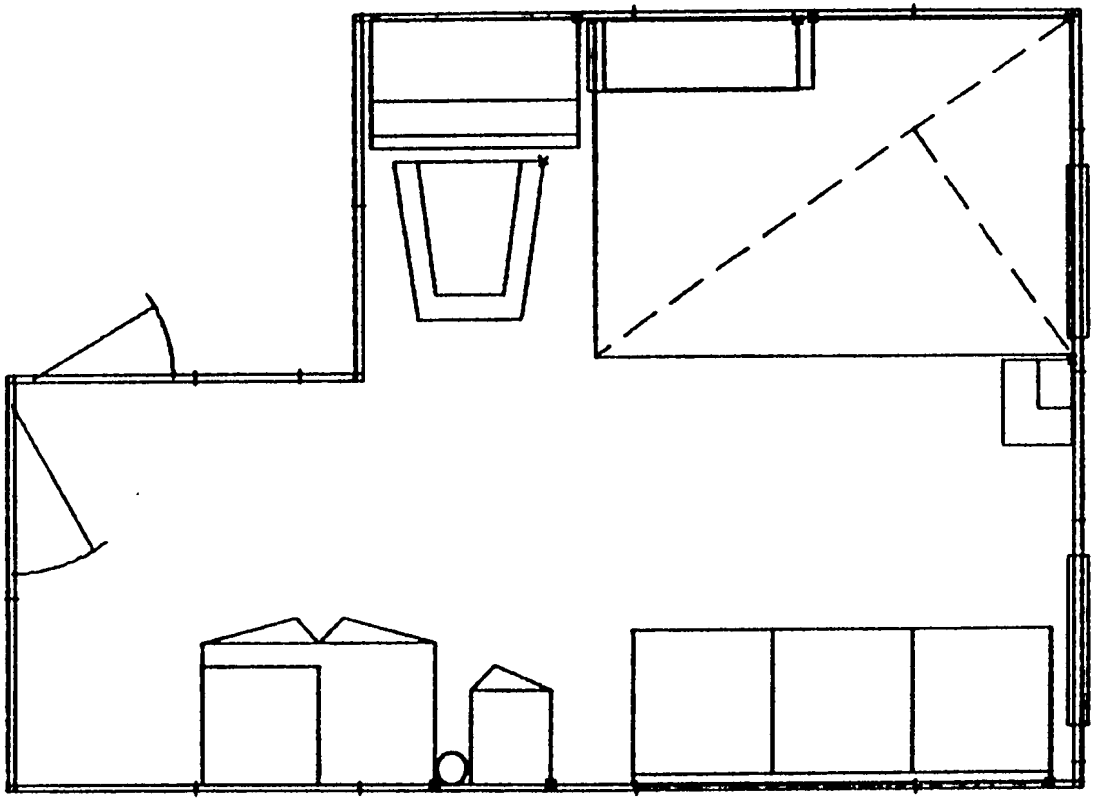
Procedure for sanitary fittings

Byaprocedure similar to that already examined for furniture, sanitary fittings with all accessories are also positioned **by** screen in the sanitary rooms and also here it is possible to obtain very easily all the drawings and the material lists.



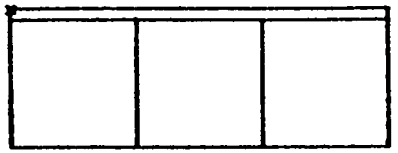
CABINA DOCS

>128.

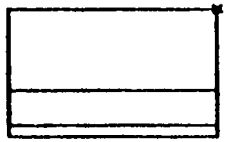


18

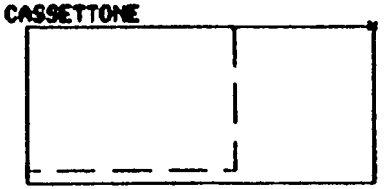
>129.



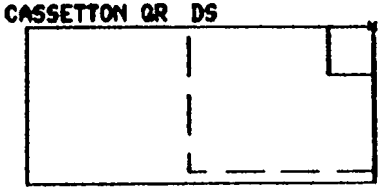
DIVANO



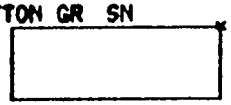
CASSETTONE



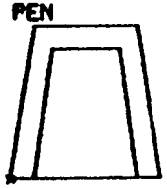
CASSETTON QR DS



CASSETTON QR SN

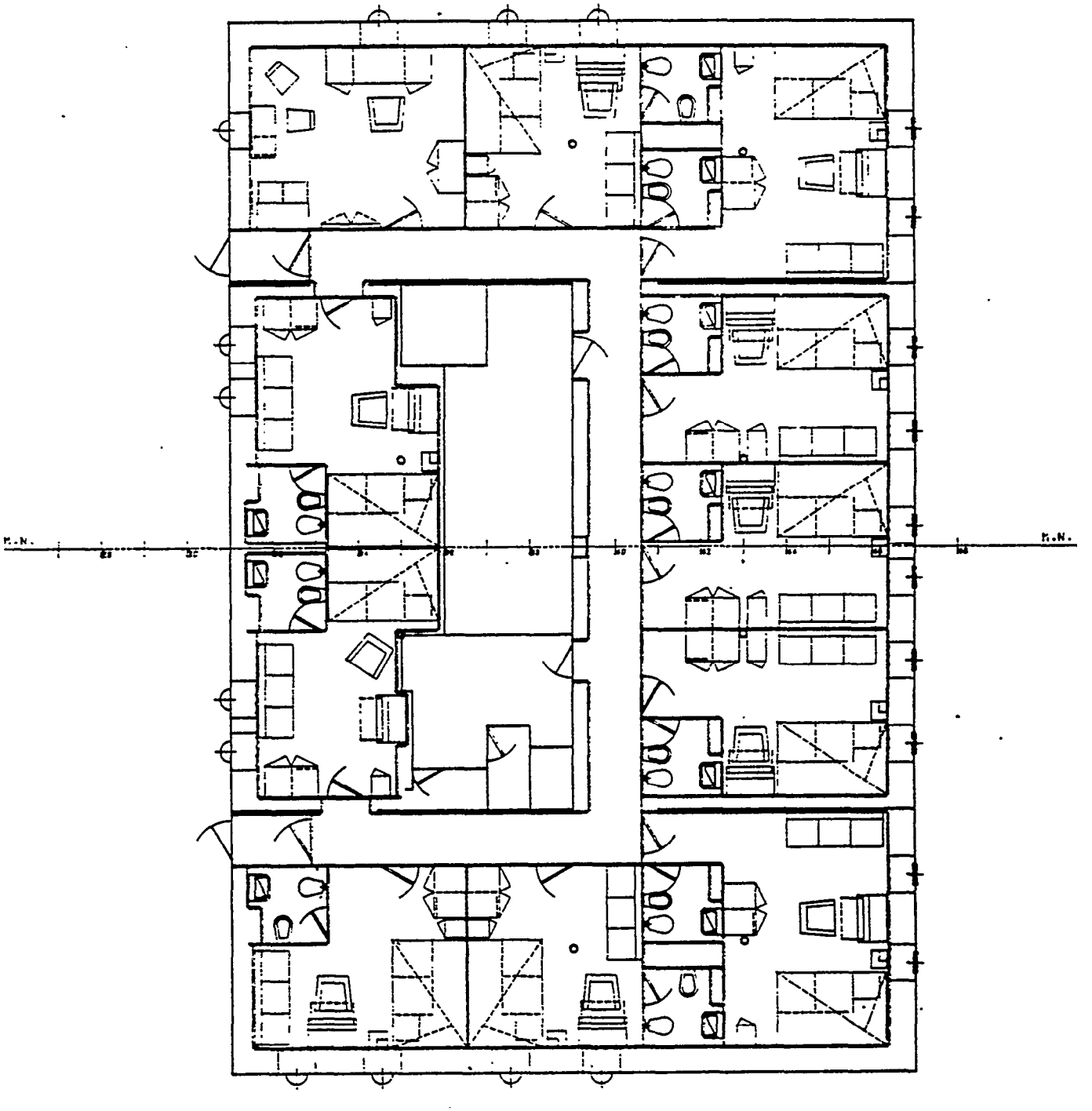


LIBRERIA PEN



POLTRONCINA

CABINA DOCS



FURNITURE LIST OF A ROOM

LIST. MOBILI VANO H009 DEST. C01C

STAB 110 | 01 | 02 | DATA 1/2/70

COSTR 4343 — JOB ORDER CODE

ZONA

DIS. 74 DIS/01 PALLET

TIPO	COLORE	CODICE OTS	MARC. ZZ0
FURNITURE TYPE	COLOUR	MATERIAL CODE	PIECE NUMBER
LETTO PICC DS	TANGANICA WALLNUT	7311110000N 00100X	JE7 [illegible]LE
TAVOLO NOTTE SN	TANGANICA WALLNUT	7331180000X 08710A	JE7 [illegible] TV
CASSETTONE	TANGANICA WALLNUT	7337100000N 10750T	JE7 [illegible]TCN
ARMADIO GUAR DS	TANGANICA WALLNUT	7321110000S 011800	JE7 [illegible] RR
STIPETTO DS	TANGANICA WALLNUT	7325110000C 05500B	JE7 [illegible] R
DIVANO	REX N. 1121 BROWN	7357110000H 06030H	JE7 [illegible] N
LIBRERIA PEN	TANGANICA WALLNUT	7323110000K 03410B	JE7 [illegible] L
POLTRONCINA	REX N. 1121 BROWN	7353100000M 02020Q	JE7 [illegible] O

Layout of ceiling lamps and anemostats

This work is performed cabin by cabin. After automatic subdivision of ceilings into panels, by very simple commands, by pointing the screen cross-hair on the chosen panel, storing is made of the position and type of lamps and of the position and dimensions of holes for anemostats installation. In order to speed up the process, some standard positions of the holes in the various panels are fixed and, if it is necessary, non standard elements can also be very simply stored.

HARDWARE

Man-computer communication within the CASA system is realized through a TEKTRONIX 4014 terminal connected with the Main Computer; the installation of a refresh buffer allows, for the procedures which require this performance, also a limited activity in the refresh mode.
The configuration is completed by a hard-copy connected to the screen and by an off-line plotter for production of all the drawings utilized for design completion, for workshop manufacturing, and for installation on board of all furnishing materials of the superstructures.
The choice of such hardware turned out to be a very profitable compromise from a technical-economical point of view as it unifies the advantages of low purchase and maintenance costs and 'the advantages to offer the capability of moving on the screen geometrical figures even not very complex.

MODULARITY OF THR SYSTEM

The C.A.S.A. system has been designed so that it can be modularly inserted in the company's information system.
With this purpose the System organizes and prepares all data so that they can easily be retrieved from the systems connected with CASA. These systems deal with the handling of all furnishing materials from purchase to arrival of components to the yard, to their assemblying at the workshop, and to their definitive installation on board.

ADVANTAGES

After being exploited on a considerable number of ships the CASA system has widely proved its validity in furnishing design and in workshop documents preparation.
The most significant advantages are:

l - reduction of technical times for the preparation of the workshop documentation which - (for a prototype ship) - decreased from 12 down to 6 months; this problem is maximally felt when prototype ships with short delivery times are involved;

2 - Reduction of technical office work load which is decreased (in the area interested by the system) from 6000 down to 2000 hours;
3 - Saving on costs of materials in stock, better utilization and reutilization of materials;
4 - Rationalization of -yard's work thanks to a better quality, quantity and quickness of information received.

Further' more utilization of CASA on different types of ships has shown its high flexibility by obtaining excellent results on ferry-boats, tankers, merchantship, and off-shore.